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AMCCMS Code 5014.11.841

Technical Memorandum 6-63

A METHOD FOR INCREASING EFFICIENCY OF DIAL  
CHECK-READING

Sidney G. Dashevsky

Sam Glucksberg

March 1963

APPROVED



JOHN D. WEISZ

Technical Director

Human Engineering Laboratories

U. S. ARMY HUMAN ENGINEERING LABORATORIES  
Aberdeen Proving Ground, Maryland

# ABSTRACT

The conventional check-reading display, using dials in rows and columns with pointers aligned at the 12 o'clock position, was compared to a similar display with pointers connected by straight lines, i.e., with the pointers in normal position they are seen as segments of straight lines. In this latter display, called the extended-line display, the subjects' task was merely to detect a break in a line, rather than to detect a deviant pointer. Detection of deviant dials was consistently superior with the extended-line display; the displays did not differ with respect to the observers' ability to localize deviant dials in the display array.

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## A METHOD FOR INCREASING EFFICIENCY OF DIAL CHECK-READING\*

### INTRODUCTION

Certain displays, such as some engine-function indicators, maintain "normal" patterns and provide cues for corrective action only when one or more elements in the display deviate from a prescribed value. When a group of instruments constituting such a display is monitored for deviations from prescribed values, the performance is referred to as "check-reading". The instruments are checked intermittently for indications of malfunction, but they are not read for any particular value.

The efficiency of monitoring such displays is a function of the particular arrangement of dials and pointers. A commonly recommended arrangement is shown in Figure 1, where the dials are arranged in rows and columns, and the pointers are normally aligned at the 12 o'clock position (1, cf. pp. 305-306). For simple check-reading, the grouping shown in Figure 1 would be equally good if the pointers were aligned horizontally, i.e., at the 9 o'clock position. The display shown in Figure 1 will be referred to as the aligned (AL) display.

This paper reports a method for further reduction of errors in check-reading. The display in Figure 1 was modified by the addition of extension lines between dials, as shown in Figure 2.

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\*The data reported here were collected during the summer of 1962, and represent a portion of a more comprehensive study performed by S. Dashevsky. This report was written, and data analyzed, by S. Glucksberg. Any errors of omission or commission are the responsibility of the latter writer.

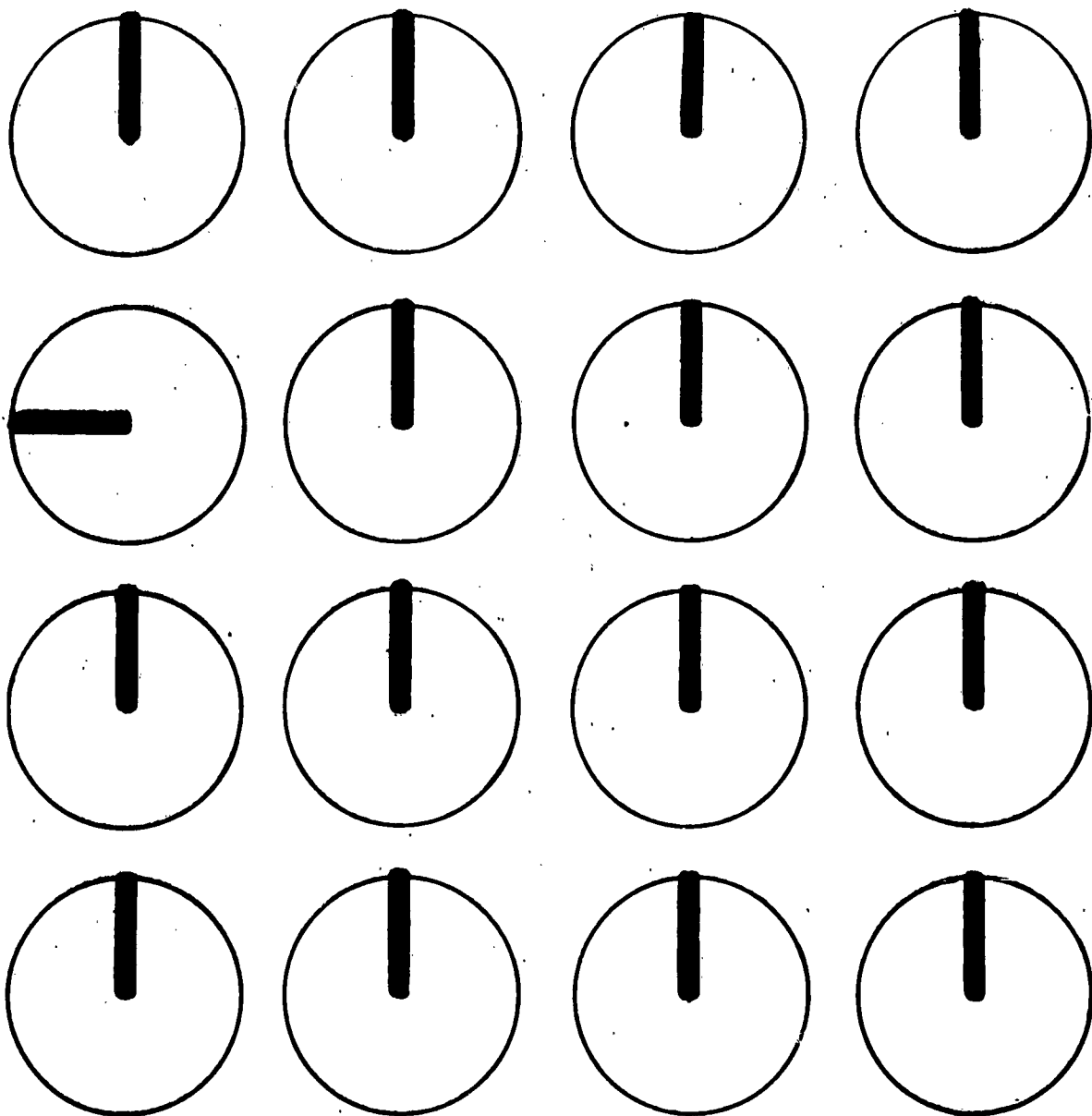


Fig. 1. ALIGNED (AL) DISPLAY



## RESULTS AND DISCUSSION

Two kinds of errors were used to measure performance: detection errors, and location errors. A detection error was scored when (a) the display contained a deviant pointer, but no deviation was recorded on the answer sheet; or (b) the display contained no deviant pointer, but a deviation was recorded on the answer sheet. Location errors were errors in specifying the location of the dial with the deviant pointer.

TABLE 1

Detection and Location Errors as a  
Function of Display (N = 18/cell)

		Display		p (t-test)
		Aligned (AL)	Extended Line (EL)	
Detection errors	Mean	3.0	0.4	.01
	SD	0.95	0.78	
Location errors	Mean	0.4	0.5	--
	SD	0.68	0.83	

The data obtained are presented in Table 1. The means of location errors were not significantly different for the two display conditions. However, the EL display was clearly superior to the AL display in terms of detection errors. The extent of this superiority

is perhaps not fully apparent in the mean scores alone. With the AL display, every S committed at least one detection error (range: 1 - 5); with the EL display, 13 of the 18 Ss committed no detection errors (range: 0 - 2).

Error detection per se is of prime importance in check-reading tasks, since, once a deviation is noted, its precise location can usually be determined without difficulty. On this basis, EL displays should be considered for check-reading applications.

#### REFERENCE

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The conventional check-reading display, using dials in rows and columns with pointers aligned at the 12 o'clock position, was compared to a similar display with pointers connected by straight lines, i.e., with segments of straight lines. In this latter display, called the extended-line display, the subjects' task was merely to detect a break in a line, rather than to detect a deviant pointer. Detection of deviant dials was consistently superior with the extended-line display; the displays did not differ with respect to the observers' ability to localize deviant dials in the display array.

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